

Natural Gas-optimized Advanced Heavy-duty Engine

August 2011

Fact Sheet

The Issue

Particulate matter emissions from diesel engines elevate the risk of cancer, especially among infants and the elderly. The use of natural gas vehicles as a clean alternative is currently limited to smaller engine displacements and spark ignition, which results in lower performance.

A large displacement natural gas engine has difficulty achieving equivalent diesel power and efficiency due to the combustion process and throttle operation at part-load. Research is needed to overcome barriers to increase engine displacement size while maintaining low emission levels and high efficiency.

Project Description

This research will evaluate and further develop the promising high pressure direct injection technology, which allows natural gas engines to operate at the same high efficiency and high power density as today's heavy-duty diesel engines. Opportunities for cost effectiveness will be addressed using a systematic approach and Volvo's global supply base.



Photo Credit: infotruck.blogspot.com

The project will accelerate the research and development of an advanced natural gas engine concepts that can be used in the heavy duty vehicles built by the Volvo Group. The overall objective is to develop a natural gas engine concept with diesel engine performance in terms of drivability and efficiency. Potential to further improve fuel efficiency through enhanced in-cylinder mixing will also be investigated.

PIER Program Objectives and Anticipated Benefits for California

This project will contribute substantially to increased adoption of heavy-duty natural gas vehicles in the California and, more broadly,

North American markets by developing the emission performance of the natural gas engine to meet the US EPA 2010 emission standards and additional California Air Resources Board regulations. The goal is to replace 90 percent of the petroleum-based diesel and lower greenhouse gas emissions by 20 percent while complying with California emission regulations, and keep non regulated emissions at sustainable levels.

Preliminary Findings

- Completion of a report on HPDI (High Pressure Direct Injection) engine performance with optimized hard ware, except for a version that can be made public.
- Complementary EATS (Exhaust After Treatment System) simulations have been performed and reported.
- The EATS hardware for engine tests has been selected.
- Report on engine test plan for hardware variations has been formulated.

Project Specifics

Contract Number: PIR-08-046
Contractor: Volvo Technology of America
City/County: Greensboro, USA
Application: Nationwide
Contract Amount: \$999,970
Match Funding: \$390,259 Westport Innovations, Inc.
Contract Term: August 2009 to October 2010

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